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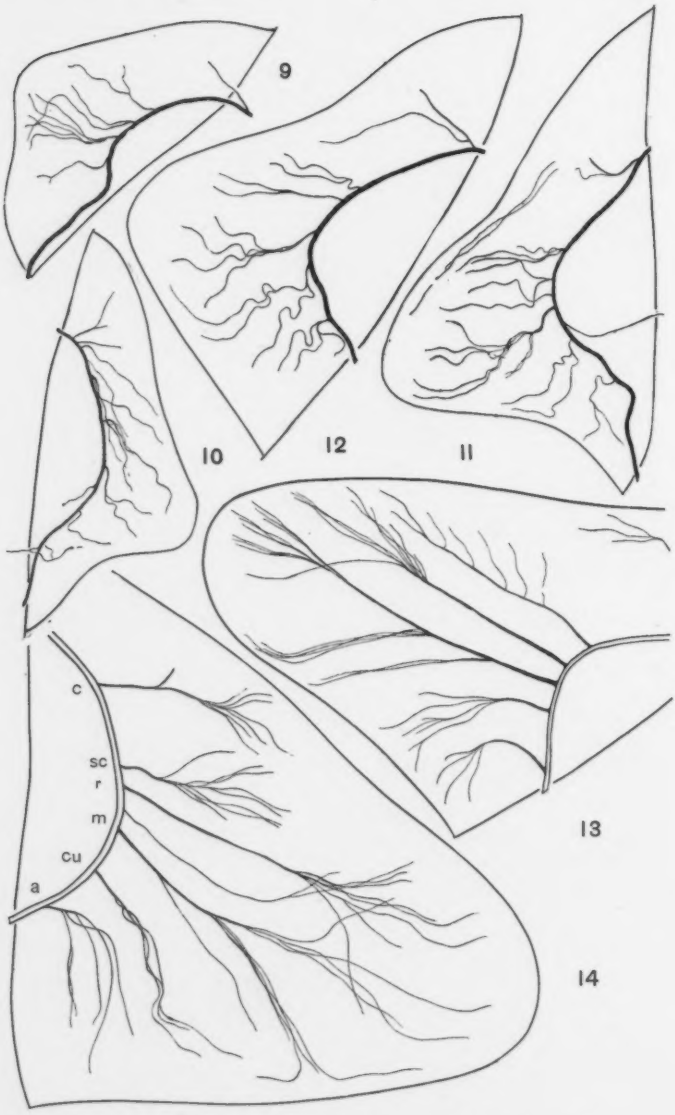

TRACHEATION OF WINGS OF EARLY LARVAL INSTARS OF GOMPHUS.—SCHMIEDER.

ENTOMOLOGICAL NEWS

AND

PROCEEDINGS OF THE ENTOMOLOGICAL SECTION

THE ACADEMY OF NATURAL SCIENCES, PHILADELPHIA

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Studies in the Genus Hetaerius (Col., Histeridae).

By J. O. MARTIN, Berkeley, California.

(Continued from page 277)

Hetaerius setosus n. sp.

Form broadly quadrate oval. Color ferruginous. Punctate and setose.

Head but slightly concave at vertex, which is evenly, moderately punctate, each puncture bearing a long bristle-like seta; front impunctate, shining, minutely rugose; labrum smooth shining.

Prothorax twice as wide as long; minutely rugose except in the oblique depression which is smooth and impunctate; disc evenly, moderately punctate and setose, the setae long, recurved and tapering to a sharp point, minutely plumose along cephalic margin. Lateral areas more closely punctured and setose, these setae becoming coarser, longer and more evidently plumose at the outer edge; sides evenly rounded from transverse sulcus to apex; inner carina of the oblique sulcus bends sharply inward opposite the transverse sulcus, by this separation producing a deep triangular depression opposite the bulla and narrowing the oblique depression at this point. Bulla smooth shining on inner half, outer portion punctate and bordered by coarser and longer plumose setae.

Elytra shining and minutely rugose; space between the first dorsal

stria and the elytral suture evenly, moderately punctate with setae similar to those on disc of thorax; punctures without regular arrangement; each stria has along its raised edge a row of setigerous punctures slightly closer together than those on the disc; parallel to this is another single row of setigerous punctures more widely spaced. First dorsal stria reaches but one-half the distance to apex; remaining striae extend to apex.

Pygidium and propygidium evenly, moderately, punctate and setose.

Prosternum finely punctate and rugose but lacking setae; bordered area contracted between the coxae, thence gradually separating to one-half the length of the prosternum where they merge into the prosternal surface, leaving the cephalic end of the margined area open. Cephalic end of prosternum emarginate; immediately caudad of the emargination there is a slight indentation in the raised portion. Meso- and metasternum punctate and hairy. Legs evenly and moderately punctate on the outer surface, setae shorter than those on upper surface of body. Length 2 mm.; width 1.5 mm.

Described from a series of nine specimens taken at North Fork, California, in the nests of *Formica plicicornis? Type* in my collection, paratypes in the collection of Mr. Henry Dietrich who collected the species.

Hetaerius nudus n. sp.

Of the same form as *setosus*, which it resembles in many respects; it has more yellow in the body color and is noticeably less convex.

Vertex of head flat, evenly, moderately punctate, punctures with short, squamose, recumbent hairs; front impressed, finely rugose, impunctate; labrum finely rugose, shining.

Prothoracic disc evenly, moderately, punctured with minute, short recumbent hairs in each puncture; basal end of oblique depression broad; lateral areas finely rugose, marked with a series of slightly raised lines extending from transverse sulcus to the apex; between these lines are single rows of punctures bearing the same type of hairs as those on the disc; outer margin with a row of coarser, curved hairs; inner margin for half its length, beginning at transverse sulcus, with a single row of flattened, recumbent hairs; bulla finely rugose on outer half, which is punctate with coarse, squamose, recumbent hairs, outer margin with hairs like those on margin of lateral area, inner surface finely rugose, impunctate. Carinae of the oblique sulcus not as widely separated at base as in *setosus*. Outer margin of lateral area while rounded shows a slight tendency to angulation at one-third the distance from apex to transverse sulcus.

Elytra evenly, moderately punctured and with the same minute, recumbent hairs as those on the prothoracic disc; the first and second dorsal striae of same length and not quite reaching to apical margin.

Prosternum of the same type as in *setosus* but with the margined area narrower and the general surface less convex; cephalic margin more deeply emarginate and with a more pronounced prosternal pit.

Pygidium and propygidium evenly, moderately punctured and with the same type of hairs as on upper side of body. Legs on outer surface and remainder of under surface the same. Length 2 mm.; width 1.5 mm.

Described from five specimens taken by Mr. Henry Dietrich at North Fork, California, in the nests of *Formica plicicornis? Type* in my collection, paratypes in that of Mr. Henry Dietrich.

This species while close to *setosus* is distinct in the characters given above. The hairs are so minute as to give it a naked appearance when compared with that species.

Hetaerius dietrichi n. sp.

Form quadrate oval; ratio of extreme length to width as seven and a half to five plus; color ferruginous.

Head at vertex nearly flat, where it is coarsely punctate and rugose; punctures with squamose, suberect hairs, a few of which near thorax are twice as long as the others, all being plumose; front and labrum punctate and rugose, shining.

Thorax less than twice as broad as long; discal area smooth, shining, thickly punctate in front, but becoming less so at base, punctures with short, small, yellow hairs; lateral area more coarsely punctured, hairs of the same type as on the disc; bulla slightly smaller in proportion to lateral area than usual; transverse sulcus broad and shallow, becoming more narrow toward the oblique sulcus; outer half of bulla coarsely punctate and hairy.

Elytra smooth, shining, finely punctured, punctures with short minute hairs; first and second dorsal striae reaching three-fourths the distance to apex.

Pygidium and propygidium shining, minutely rugose and very finely punctate with minute hairs in the punctures.

Prosternum closely punctate and rugose with short minute hairs in the punctures; margined area with carinae convergent between the coxae, thence divergent to less than half the length of prosternum, where they converge toward a common point, in some cases very nearly meeting but in the majority of cases well separated, leaving margined area open in front. Meso- and metasternum shining, less closely punctured than prosternum, punctures with short, minute hairs. Outside of legs sparsely punctate, the accompanying hairs coarser and evidently plumose. Length 1.5 mm.; width 1.25 mm.

Described from six examples taken by Mr. Henry Dietrich at Dalton Creek, Fresno County, California. I have also a single example which I am unable to separate from the above

which was found by Mr. E. R. Leach of Piedmont, California, floating in an irrigation ditch in Nevada County, California. *Type* in my collection, paratypes in the collection of Mr. Henry Dietrich.

This small species varies in amount of vestiture, one specimen being almost without hairs, the type being a fair average. It also varies in the distance apart of the cephalic ends of the carinae enclosing the margined area of the prosternum; I have seen no case where they actually meet, but in two instances they very nearly do.

Table to the Species of Hetaerius.†

Prosternum subcylindrical.
  Posterior femora over three times as long as wide.
    Pygidium and propygidium with the punctures separated by a space equal to the diameter of a puncture....1. **morsus** Lec.
    Pygidium and propygidium with the punctures contiguous and coarser than the above.....2. **strenuus** Fall
  Posterior femora about two and one-half times as long as wide.
    Pygidium without hairs, propygidium with hairs.
      Centre of thoracic discal area punctate and hairy. 3. **tristriatus** Horn.
      Centre of thoracic discal area finely punctate and without hairs .....4. **hirsutus** Mart.
    Pygidium and propygidium both with hairs.
      Outer surface of legs moderately clothed with long, pointed, plumose hairs .....5. **williamsi** Mart.
      Outer surface of legs moderately punctate, femora without hairs, tibia with small pointed hairs.....6. **zelus** Fall
      Outer surface of legs moderately, closely punctate with minute blunt hairs .....7. **blanchardi** Lec.
    Pygidium and propygidium both hairless.....8. **horni** Wickh.
Prosternum depressed.
  Prosternal margined area closed in front by a coalescence of the margining carinae.
    Carinae of the margined area converging to a rounded point, slightly sinuate before meeting.
      Upper surface of body sparsely punctate with suberect, squamose hairs .....9. **minimus** Fall
      Upper surface of body closely punctate with long, pilose hairs .....10. **pilosus** Mart.

†I am unable to find any record of the capture of *Hetaerius helenae* Mann in the United States and see no reason for its inclusion in Leng's List.

Carinae of the margined area closing with a rounded arch in front.

With a few scattered hairs on disc of thorax and elytra, 11. **brunneipennis** Rand

With numerous long, pointed hairs on disc of thorax and elytra ..... 12. **californicus** Horn

Without hairs, but with evident punctures on disc of thorax, elytra punctate with a few hairs..... 13. **exiguus** Mann

Prosternal margined area with carinae not meeting in front.

Carinae beyond intercoxal convergence, divergent to their cephalic ends, leaving margined area widely open in front.

Pygidium and propygidium sparsely punctate with long, pointed hairs ..... 14. **setosus** n. sp.

Pygidium and propygidium without long hairs.

Pygidium and propygidium with minute, squamose, recumbent hairs ..... 15. **nudus** n. sp.

Pygidium and propygidium without evident hairs, 16. **wheeleri** Mann

Carinae of the margined area converging at apex, but not meeting.

Disc of thorax with short, minute, sparse hairs, 17. **dietrichi** n. sp.

Disc of thorax with long, pilose hairs..... 18. **vandykei** n. sp.

In concluding I wish to extend thanks to Mr. H. C. Fall, who examined for me the types of *morsus* Lec. and *helenae* Mann; also to Dr. E. C. Van Dyke, who kindly loaned me all of his material in this genus. I am also indebted to Mr. Henry Dietrich for the loan of his material, including three new forms. Prof. H. F. Wickham also sent his specimens which included a number that I had not seen.

Notes on two Acalyptrate Diptera.

In 1913 (Jour. N. Y. Ent. Soc. vol. 21, p. 294) Dr. A. L. Melander described *Mumetopia nitens*, distinguishing it from *terminalis* Loew by its partly black face and parts of the head. This form is merely the male of *terminalis*, which has the head and its parts yellow or whitish.

In the same paper he recorded *Cerodonta femoralis* Meigen from the west, an error which I avoided in my paper on the family which appeared at the same time. My view has since been confirmed by Dr. Aldrich in print. This year I took one specimen of the true *fulvipes* Meigen (*femoralis* Meigen) at Glen Echo, Maryland, so that the species really does occur in America though not present in Melander's material from the west. Hendel has recently followed Melander in recording *femoralis* from this country, the record being based upon the dark form known in Europe as *denticornis* var. *nigroscutellata* Strobl which is common in the extreme west.—J. R. MALLOCH, Bureau of Biological Survey, Washington, D. C.

List of the Robberflies (Asilidae, Diptera) of North Carolina.

By C. S. Brimley, Entomological Division, N. C. Department of Agriculture, Raleigh, N. C.

The following list of the robberflies of North Carolina is based on the records of this department which have been gathered by Mr. Franklin Sherman, Chief in Entomology since 1900, and by his various assistants. The initials following the records are those of Mr. Sherman, Messrs. G. M. Bentley, S. C. Clapp, J. E. Eckert, R. W. Collett, S. W. Foster, V. R. Haber, C. O. Houghton, R. W. Leiby, W. B. Mabee, C. L. Metcalf, T. B. Mitchell, M. R. Smith, R. S. Woglum, and myself, his assistants at various periods, also of Mr. A. H. Manee, of Southern Pines, N. C., and Mr. C. W. Johnson, of Boston, Mass. The Raleigh records are not as a rule initialled.

I. Subfam. Leptogastrinae.

Leptogaster badius Loew. Raleigh, May 16, 1909; June 30, 1921.

Leptogaster brevicornis Loew. Raleigh, early June, 1909; May 30, 1921.

Leptogaster incisuralis Loew. Southern Pines, late August, 1912, AHM.

Leptogaster obscuripennis Johnson. Raleigh, July 25, August 4, 16, 1906; August 13, 21, 1921; Blantyre, early September, 1906. RSW.

Leptogaster pictipes Loew. Raleigh, May 2, 1905; September 2, 1904; June 5, 11, 1906; Murfeesboro, June 9, 1895, CWJ.

Leptogaster testaceus Loew. Raleigh, early August, one, FS.

Leptogaster virgatus Coq. Raleigh, taken on May 31, June 13, 14, August 13, 16, in different years.

II. Subfam. Dasypogoninae.

Ceraturgus cruciatus Say. Swannanoa, July 15, 1917, RWL; Linville Falls, late June, 1920, FS.

Ceraturgus nigripes Will. Linville Falls, late May and early June, 1920, FS; Spruce, June, 1911; late May, 1913, FS; Black Mts., late May, 1910, FS; Andrews, mid-May, 1908, FS; Macon County between Highlands and Franklin, 2200 to 4000 ft., early May, 1908, FS.

Ceraturgus sp., larger than *cruciatus* with blackish wings. Raleigh, June 30, 1921, TBM.

Cyrtopogon alleni Back. Spruce, late May, 1913, CSB.

Cyrtopogon falto Walker. Spruce, late May, 1913, CSB.

CYRTOPOGON LYRATUS OS. Black Mts., July 18, 1919, about 5000 ft., RWL.

CYRTOPOGON MARGINALIS Loew. Linville Falls, late May, 1920, FS; Spruce, late May, 1913, FS; Highlands, July, 1907; early May, 1903, FS; Aquone, mid-May, 1911, FS; Macon County between Highlands and Franklin, mid-May, 1908, FS.

DEROMYIA PLATYPTERA Loew. Goldsboro, July 28, 1921, one male, TBM.

DEROMYIA RUFESCENS Macq. Raleigh, late August, 1914, CSB; Beaufort, August 11, 1902, FS; Southern Pines, September 14, 1912, AHM; McCullers, September 10, 1921, TBM.

DEROMYIA TERNATUS Loew. Raleigh, June to September, not uncommon; Southern Pines, mid-July, 1906, AHM; Marion, mid-July, 1907, FS; Havelock, late June, 1905, FS.

DEROMYIA UMBRINUS Loew. Blowing Rock, August 29, 1902, two, FS.

DEROMYIA WINTHEMI Wied. Raleigh, mid-July to mid-September, not uncommon; Elizabeth City, early and mid-August, 1919, FS; Statesville, mid-July, 1919, FS; Durham, July, 1903, SWF.

DIOCTRIA ALBIUS Walker. Swannanoa, June 22, 1917, RWL.

DIOCTRIA BREVIS Banks. Black Mts. (north fork of Swannanoa River), Banks, Psyche, 1917, p. 117; Linville Falls, early June, 1920, two females, FS.

DIZONIAS TRISTIS Walker. Willard, July 20, 1920, one male, VRH.

ECHTHODOPA FORMOSA Loew. "North Carolina," Back, Trans. Am. Ent. Soc., vol. 35, p. 249.

HOLCOCEPHALA ABDOMINALIS Say. Late June to late September, common at Raleigh in rank herbage in damp shady places; also taken at Blowing Rock, in August and September; Grandfather Mt., up to 4000 ft. in September; Black Mts. in mid-July at about 5000 ft.; Statesville in mid-June; Greensboro in early October; Gibson in mid-October. Not yet taken east of Raleigh.

HOLOPOGON GUTTULA Wied. Pendleton, June 7, 1895, CWJ; Southern Pines, early May, 1912, AHM; Swannanoa, mid-June, 1919, FS.

LAPHYSTIA FLAVIPES Coq. "North Carolina, Morrison," Back, Trans. Am. Ent. Soc., vol. 35, p. 229.

LAPHYSTIA SEXFASCIATA Say. Beaufort, mid-June, 1903; early July, 1909, FS; Wilmington, September, 1905; July, 1906, RSW; mid-October, 1919, MRS; September 23, 1920, WBM; Wrightsville, September 23, 1920, TBM.

LASIOPOGON OPACULUS Loew. Raleigh, mid and late April and early May, several specimens; Lake Toxoway, May, 1907, Mrs. A. T. Slosson.

NICOCLES PICTUS Loew. Southern Pines, October and November, common, AHM.

NUSA FULVICAUDA Say. "North Carolina," McAtee, Ohio, Jour. Sci., vol. 19, p. 246.

STENOPOGON SUBULATUS Wied. Lumberton, September 6, FS.

STICHOPOGON TRIFASCIATUS Say. Beaufort, August 9, 11, 1902; early July, 1909; mid-September, 1911 and 1912, FS.

TARACTICUS OCTOPUNCTATUS Say. Raleigh, June 30, 1921, CSB; Delco, early May, 1920, FS.

III. SUBFAM. LAPHRINAE.

ATOMOSIA GLABRATA Say. Raleigh, July 28, 1906, CSB; Swannanoa, mid-July, 1919, above 3000 ft.; June 22, 1917, RWL.

ATOMOSIA PUELLA Wied. Lake Ellis, May 27, 1907, CSB; Southern Pines, late July, 1912, AHM; Swannanoa, mid-June, 1919, FS; Spruce, June, 1911, FS; Blowing Rock, July, 1904, GM; Hendersonville, June, 1907, FS; Hot Springs, Mrs. Slosson.

CEROTAINIA MACROCERA Say. Raleigh, July 25, 1906; June 25, July 10, 1907, CSB.

DASYLLIS AFFINIS Macq. Raleigh, mid-September to mid-December, rather common; also within the same season at Lumberton, Wadesboro, Gibson, Dundee, Pilot Mt. and Newton. Not as yet taken east of Raleigh.

DASYLLIS CHAMPLAINI Walton. Dillard-Highlands road, July 11, 1921, TBM; Swannanoa, mid-June, 1919, FS.

DASYLLIS CINEREA Back. Raleigh, late March to early May, not infrequent; Southern Pines, March, 1903, Manee.

DASYLLIS DIVISOR Banks. Black Mts., late May, 1910, FS; Linville Falls, late May to late June, 1920, FS; Andrews, mid-May, 1907, FS and CSB.

DASYLLIS FLAVICOLLIS Say. Same places and dates as preceding, and also Spruce, late May, 1913; June, 1911, FS.

DASYLLIS GROSSA Fabr. Raleigh, mid-June, CSB; late June, 1921, TBM; June 14, 1921, CSB; Cedar Grove, June 13, 1901, FS; Highlands, July, 1907, FS; Dillard-Highlands road, July 11, 1921, TBM; Swannanoa, mid-June, 1919, FS.

DASYLLIS POSTICATA Say. Pendleton, June 7, 1895, CWJ.

DASYLLIS SACRATOR Walker. Blowing Rock, June 27, 1901; July 24, 1904, FS; Black Mts., late May, 1910, FS; Swannanoa, mid-June, 1919, FS; Spruce, June, 1911, FS.

DASYLLIS THORACICA Fabr. Black Mts., late May, 1910, FS; Southern Pines, specimen received from A. H. Manee, by CSB.

DASYLLIS VIRGINICA Bks. Raleigh, mid-May, 1915, CSB; April, CSB.

LAMPRIA BICOLOR Wied. Raleigh, October 1, 1900, FS; June 16, 1921, CSB; Pendleton, June 7, 1895, CWJ.

LAMPRIA RUBRIVENTRIS Macq. Wilmington, October 15, 1919, M. Kislink.

LAPHRIA AKTIS McAtee. Craggy Mts., June 8, 1916, two, RWL.

LAPHRIA INDEX McAtee. Linville Falls, mid-June, 1920, one male, FS.

LAPHRIA SAFFRANA Fabr. Wilmington, April 24, 1920, one, RWL; Southern Pines, May, not common, AHM; Tryon, W. F. Fiske (McAtee, Ohio Jour. Sci., vol. 19, 169).

LAPHRIA SERICEA Say. Blantyre, May, 1907, FS; Spruce, late May, 1913, CSB; Black Mts., McAtee, *l. c.*, 157; Linville Falls, late May to late June, 1920, FS; Blowing Rock, July 22, 1904, GMB.

LAPHRIA SICULA McAtee. Raleigh, May 30, 1921, CSB; mid-June, 1914, CLM; July 5, 1904; July 12, 1921; July 14, 1908, CSB; Waynesville, July, 1901, FS; Linville Falls, late June, 1920, FS.

POGONOSOMA MELANOPTERA Wied. Pendleton, June 7, 1895, CWJ.

IV. SUBFAM. ASILINAE.

ASILUS ANGUSTIPENNIS Hine. Highlands, September, 1906, RSW.

ASILUS ANTIMACHUS Walker. Southern Pines, early April, 1913, AHM.

ASILUS AURICOMUS Hine. Raleigh, mid-October, 1904, SMB.

ASILUS AUTUMNALIS Bks. Swannanoa, mid-June, 1919, FS.

ASILUS FLAVOFEMORATUS Hine. "North Carolina," Hine, Ann. Ent. Soc. Am., 1909, 153.

ASILUS FUSCATUS Hine. Raleigh, June 14, 1921, CSB; Pendleton, June 7, 1895, CWJ; Murfreesboro, June 8, 1895, CWJ; Swannanoa, mid-July, 1919, above 3000 ft., RWL.

ASILUS GRACILIS Wied. Raleigh, late June, 1917, CSB.

ASILUS LECYTHUS Walker. Raleigh, May 18, 28, 1921, CSB; mid-May, 1921, TBM; Swannanoa, mid-July, 1919, RWL.

ASILUS MANEEI Hine. Southern Pines, May 15, 1908, A. H. Manee; Statesville, mid-July, 1919, FS.

ASILUS NOTATUS Wied. Andrews, mid-May, 1908, FS; Highlands, September, 1906, RSW; Craggy Mts., June 8, 1916, RWL; Blowing Rock, July 20, 1904, FS.

ASILUS NOVAE-SCOTIAE Macq. Raleigh, early July, FS; Blowing Rock, August 29, 1902, FS; Hot Springs, Mrs. Slosson.

ASILUS ORPHNE Walker. Cranberry, Linville Falls, Black Mts., Craggy Mts. and Spruce, late May to late June.

ASILUS SADYTES Walker. Raleigh, mid-June, 1906, RSW; July 8, 1902, FS; Cary, September 19, 1900; also at Wilkesboro, Blowing Rock, Blantyre and Highlands in August and September.

ASILUS SERICEUS Say. Raleigh, early June, one CSB; also at Elkin, Blowing Rock, Cranberry, Swannanoa and Hot Springs in June.

ASILUS SNOWI Hine. Raleigh, May 18, 1909, CSB; July 3, 1902, GMB; August 18, 1902, COH.

ERAX AESTUANS L. (BASTARDI Macq.). Whole state, late May to early October, common.

ERAX APICALIS Wied. Southern Pines, AHM.

ERAX BARBATUS Fabr. Whole state, mid-May to early October, common.

ERAX INTERRUPTUS Macq. Whole state east of the mountains, June to September, common. I bred the species from its larva in summer of 1921.

ERAX RUFIBARBIS Macq. (AESTUANS Wied.). Whole state, mid-August to early November, common.

MALLOPHORA BOMBOIDES Wied. Southern Pines, August, September, AHM; Aberdeen, early October, 1921, TBM.

MALLOPHORA CLAUSICELLA Macq. Raleigh, early July to late September, common, bites sharply if handled incautiously; McCullers, LaGrange, Overhills, Southern Pines and Greensboro, within the same dates.

MALLOPHORA GUILDIANA Will. "North Carolina," Williston, Trans. Am. Ent. Soc. XII, 60.

MALLOPHORA ERCINA Wied. Raleigh, late July to mid-August, 6 specimens, CSB; Beaufort, August 9, 1902, FS; Statesville, mid-July, 1919, FS; mid-September, 1917, JEE.

MALLOPHORA LAPHROIDES Wied. Southern Pines, August 15, 1902, FS; August 6, 1921, TBM; Wilmington, August 1, 1921, TBM; Fayetteville, July 30, 1919, JEE.

OMMATIUS MARGINELLUS Fabr. Raleigh, August 15, 1904; June 19, 1906, CSB; Beaufort, June 15, 24, FS; Lake Ellis, June 23, 1905, CSB; Whiteville, July, 1906, RSW; Highlands, September, 1906, RSW; Swannanoa, July 10, 1913, CLM; mid-June, 1919, FS.

PROCTACANTHUS BREVIPENNIS Wied. Eastern part of state, west to Raleigh and Southern Pines, mid-April to early July, not uncommon.

PROCTACANTHUS HEROS Wied. Southern Pines, August, Manee.

PROCTACANTHUS LONGUS Wied. Castle Hayne, July 30, 1921, one, TBM. Wilmington, 1919, M. Kislink.

PROCTACANTHUS MILBERTI Macq. A specimen each from Raleigh (mid-October, 1904, GMB) and Southern Pines (early July, 1906, RSW) doubtfully identified by Prof. J. S. Hine as this. Neither specimen is in good condition.

PROCTACANTHUS PHILADELPHICUS Macq. Beaufort, early July, 1909; Kingsboro, early October, 1919, MRS; Lucama, September 29, 1920, TBM; Moncure, October 6, 1921, TBM; Greensboro, August 31, 1903, SWF; August, 1902, FS; Andrews, August, 1904, RWC.

PROCTACANTHUS RUFIVENTRIS Macq. "North Car.," Hine, Ann. Ent. Soc. Am., 1911, 158.

PROCTACANTHUS RUFUS Will. Raleigh, July 10, 1902, two, FS; late June, 1921, one, TBM; Nagshead, late August, 1919, FS.

PROMACHUS BASTARDI Macq. Raleigh, mid-June to mid-July, several, FS and CSB; Durham, July, 1903, SWF.

PROMACHUS RUFIPES Fabr. Raleigh, and Overhills, Laurinburg, Liberty, Greensboro, Barber and Wilkesboro, early July to mid-October. Common.

The greater number of the preceding species have been identified by Prof. J. S. Hine, of Ohio State University, to whom we express our sincerest thanks. Others have been named by Prof. O. A. Johannsen and the late Mr. D. W. Coquillett, and a few by myself.

The Tracheation of the Wings of Early Larval Instars of Odonata Anisoptera, with Special Reference to the Development of the Radius.

By RUDOLF G. SCHMIEDER, M.A., University of Pennsylvania, Philadelphia.

(Continued from page 262)

In the wings of *Gomphus*, stages of tracheal development were found which corresponded to those found in *Anax*. The observations and remarks made concerning the wings of *Anax*, as regards their size at the various stages of tracheal development, the variability in the number of tracheae and tracheal branches, and the condition of the tracheae, whether simple or fascicled, apply also in a large measure to the wings of *Gomphus*, as is shown in figs. 9-14. (Figs. 9-13 are of *G. villosipes*, fig. 14 is of *G. exilis*.)

In addition it should be noted that, especially in the earliest stages, the wings of *Gomphus* show even greater variations than have been described for *Anax*. Fig. 9 is a wing 0.12 mm. in length from a larva 8 mm. long. It has only five tracheae, the anal being entirely absent. The radius is branched from its point of origin, the posterior branch is bent at right angles and its distal portion passes caudad and crosses over the four anterior branches of the media. It is often found that in early stages tracheae may be very elongated so that their distal portions pass either cephalad or caudad along the edge of the wing, and this fact, together with the observation that the courses of the tracheae are at this time indefinite and largely a matter of chance, indicates that the condition of the posterior branch of *R* in this wing has no relation to the crossing of a radial branch over *M*1 and *M*2, which is found in later instars.

In fig. 10, a wing 0.15 mm. long from a 7 mm. larva, conditions are very different from the preceding, there being no less than eleven distinct tracheae originating from the transverse basal trunk. In this wing *R* is unbranched, and *M* has but two branches.

Figs. 11 and 12 are of the front and hind wings respectively of a 10 mm. larva. These wings are 0.23 mm. in length and again show noteworthy variations.

Figs. 9-12 then, represent the ontogenetic stages in *Gomphus* corresponding to the stages in *Anax* of figs. 1-3. The succeeding stage is shown in figs. 13 and 14,—wings which are 0.4 and 0.45 mm. long, and corresponds to that of figs. 4-7 of *Anax*. The differences in the sub-costa of figs. 13 and 14 are interesting, as is also the presence of an additional trachea between *R* and *M* in figs. 11 and 14, since such was never observed in *Anax*.

Can we derive from the foregoing observations any clew as to the identity of the vein *Rs;* can we now determine whether the trachea crossing *M*1 and *M*2 really represents *Rs* and that we should therefore call the vein which forms along its course and in the adult lies posterior to *M*2 the radial sector?

Needham has shown that in many insects the veins of the adult may be formed independently of the tracheae and that a vein is not always supplied by its corresponding trachea. Indeed in the wings we are now considering, we see that the costa receives its tracheal supply in great part from the subcosta and radius. There is, therefore, no *a priori* reason for assuming that the trachea called *Rs* may not, although it is a branch of *R*, be supplying a vein which is a true branch of the media, especially since Tillyard has shown that in *Uropetala* the vein *Rs* is supplied by a branch of *M* as well as by a branch of *R*.

Referring again to our figures we note that the radius in the very earliest instars (figs. 2, 3, 9, 11, 12) usually shows two branches and that in the next instar it most often has two groups of branches (figs. 4, 5, 13, 14) representing the same two branches; and in addition to these a fine tracheal branch which passes backward and crosses over the two anterior branches of the media. The differences between *R* in figs. 4 and 5 and the same trachea in figs. 6 and 7 are easily explained by referring back to the conditions found in the preceding instar. All of the principal tracheae in this first stage are simple, they are not composed of fascicles of fine branches as in the two later instars. In passing from this instar to the next, the two branches of *R* seen in figs. 2 and 3 develop branches equaling themselves in caliber and pursuing a course more or

less parallel to the tracheae from which they have originated, thus producing the conditions shown in figs. 4 and 5. In fig. 4 the anterior of these two branches is now composed of three fine tracheae, the posterior branch is still a single trachea; in fig. 5 the anterior branch is three-branched, the posterior two-branched. In addition there is another fine branch, the trachea *Rs* of Needham. This trachea is always but a single fine strand in this instar and crosses over *M*1 and *M*2. It can be interpreted only as a new outgrowth of the radius, appearing for the first time in this instar, and not as the original posterior branch of this trachea which has shifted its position. In fig. 1 the radius has no branches; a larva in which such a condition obtains would in the succeeding instar show a condition such as is represented in figs. 6 and 7. The distal end of the vein has produced a branch so that it is now double at the end, in the same manner as the two branches of *R* in figs. 2 and 3 have given rise to the two anterior groups of branches seen in fig. 5. In addition, *R*, in figs. 6 and 7, shows a caudal branch *Rs* which again is a new outgrowth, appearing for the first time in this instar, just as the small branches which have appeared on the anterior side of both *Sc* and *R* are new outgrowths. With respect to *M*, a similar observation might be made on the phenomenon of tracheal branching and on the presence of fascicles of tracheae where only single tracheae existed in the preceding instar. In fig. 8 is shown the instar following upon that which is represented in figs. 4-7. The fascicled condition is more evident than in the preceding instar and it is noted that *Rs*, which was heretofore always simple, has now also produced branches and is composed of a group or fascicle of three tracheae.

In the wings of *Gomphus* the same conditions obtain. The usual two-branched condition of the radius of the earliest stage is seen in figs. 9, 11, 12; and in figs. 13, 14, the next stage, in which the two radial branches have been replaced by two fascicled branches and in which there is an additional fine branch crossing over *M*1 and *M*2.

It is evident then, that when a trachea or tracheal branch

appears it is at first a single strand and not until the following instar does it acquire a fascicled condition as the result of the formation of parallel branches. Therefore, I believe that the branch *Rs*, which appears in the instar shown in figs. 4-7 of *Anax*, and in figs. 13 and 14 of *Gomphus*, is a new tracheal outgrowth appearing first in this instar and that it is not the posterior branch of the two-branched radius of the preceding instar (figs. 2, 3, 9, 11, 12). This posterior branch of *R* (called *Rs* by Needham) really develops into *R*1, while the original *R*1 of this first stage does not develop into any principal trachea, but the small branches of which it is composed pass forward into the region of the costal vein.

I believe the evidence I have given is sufficient to demonstrate that if the trachea which Needham refers to as *Rs* in his fig. 1, A, is the true *Rs*, then in the grown larva the trachea *R*1 is really *Rs*, and the *R*1 of Needham's figure is represented in later stages only by the fine tracheae which pass forward and supply the costa, or possibly it has become combined with *Rs* and the fine tracheae going to the costal vein represent branches of *R*1.

I have also shown that the tracheal branch of *R* which crosses *M*1 and *M*2 is not the original posterior branch of this vein which is seen in the first stage and which, according to Needham, has undergone a shifting in position, but rather that it is a new outgrowth of the radius and that in the instar in which it first appears it is already in the position which it occupies in the full grown larva. This trachea therefore, cannot be considered as representing *Rs* in the sense that it has developed by a shifting of the posterior branch of *R* which is observed in the earliest stage and which Needham has said must be *Rs*.

This study of the tracheation of the wings of two Anisopterous larvae has thus yielded not the slightest evidence that the trachea *Rs* of the earliest instar has undergone a shifting in position and has come to lie posterior to *M*2; but rather it has shown that this trachea retains its original position and forms, at least in part, the *R*1 of the grown larva. It has revealed that

the tracheal branch of *R* which supplies a part of the course of the imaginal vein *Rs*, appears as a secondary outgrowth whose purpose is to function as a part of the tracheal supply of a vein which for some reason has failed to receive a tracheal supply from the one of which it is properly a branch, the media. Unless we interpret *Rs* as a supplementary vein not homologous to any primitive one, we must accept the theory of Tillyard and consider it as a true branch of the media. As to the fate of the original *Rs*, the ontogenetic stages in the larva seem to indicate that, at least the tracheae corresponding to this vein, remain along the course of *R*1, and that possibly the vein *Rs* has combined with *R*1 or has taken its place. This is the conclusion we should arrive at if we trusted in the ontogenetic stages to obtain a true account of phylogeny. However, I believe that our faith in such evidence should not be too implicit and that conclusions derived therefrom should not be accepted unless supported by other evidence which may develop out of a paleontological study.

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Explanation of Plate XI.

Figs. 9-13, Wing rudiments from larvae of *Gomphus villosipes*.

Fig. 9, Length of larva 8 mm., length of wing 0.12 mm.

Fig. 10, Length of larva 7 mm., length of wing 0.15 mm.

Figs. 11-12, Length of larva, 10 mm., length of wings 0.23 mm.

Fig. 13, Length of larva 12 mm., length of wing 0.4 mm.

Fig. 14, Wing rudiment from larva of *Gomphus exilis;* length of larva 10 mm., length of wing 0.45 mm.

A New Typocerus (Coleop., Cerambycidae).

By A. B. CHAMPLAIN and J. N. KNULL, Bureau of Plant Industry, Harrisburg, Pennsylvania.

Through the kindness of Prof. J. S. Hine and Prof. J. G. Sanders, the authors were allowed to work over some undetermined Cerambycidae in the collection of the Ohio State University. An apparently new species of *Typocerus* was found. After carefully going over the literature, the species was found to be undescribed. Specimens were sent to Prof. H. C. Fall and Chas. Liebeck for examination.

Typocerus trimaculatus n. sp.

Size and form of *Typocerus velutinus* Oliv.

Head black, front finely punctate, covered with golden pubescence, which is more dense on the vertex. Prothorax black, convex, apex constricted, base impressed, finely and densely punctate, covered with golden pubescence which becomes more dense at base and apex. Scutellum triangular, densely clothed with golden pubescence. Elytra gradually attenuate to apex, which is obliquely truncate and bispinose, surface densely punctate and pubescent, bright yellow, with base, suture and tip varying in color from brunneous to piceous, and three transverse piceous bands running from suture to lateral margin. Ventral surface finely and densely punctate, clothed with golden pubescence. Legs yellow. Length 15 mm.

♂.—Antennae black; when laid over the dorsal surface, extending four-fifths the length of the elytra, joints six to eleven provided each with two large poriferous areas, the eleventh joint appendiculate and containing four such areas.

♀.—Antennae black; when laid over the dorsal surface, extending beyond the middle of the elytra, joints six to eleven provided each with two smaller poriferous areas, the eleventh joint appendiculate and containing four such areas.

Superficially this species resembles *Typocerus zebratus* Fab., but it is easily distinguished from this species by the larger size and finer punctuation of the prothorax. According to Leng's Key* it runs to *T. velutinus* Oliv. The bright yellow color of the elytra, together with the black cross bands, will at once separate the two species.

Type, a male collected at New Roads, Louisiana, on July 14, in Authors' collection. Paratypes as follows:—Gainesville, Florida, collected on May 14, by C. J. Drake, in Ohio State University collection; New Roads, La., collected on July 14, in the collection of the Pennsylvania Bureau of Plant Industry; Winnfield, Louisiana, collected on May 12, by H. C. Fall, in the collection of Prof. H. C. Fall, to whom we are indebted for the loan of the specimen.

*Entomologica Americana V. 6, p. 150—1890.

The Life History of Lerodea eufala Edwards. (Lepidoptera, Hesperiidae.)

By KARL R. COOLIDGE, Hollywood, California.

Lerodea eufala, a rather common butterfly of the southern states, extending its range thence through Mexico into Central America and the Antilles, seems to have only recently invaded California, entering by way of the Imperial Valley. No published records exist of its inhabitation in California. The late W. G. Wright, in his *Butterflies of the West Coast,* misidentifies the species, figuring it on plate 31, b and c, as *Pamphila nereus,* and stating that: "It is common enough at Yuma, but does not come further west." Dr. Lindsey, in his recent revision of the Hesperioidea, gives the range of *eufala* as "Florida, Texas, Arizona" and its seasons as "April to July, October and November."

In recent years several specimens have been taken about San Diego, and in the Coachella Valley, which is virtually an extension of the Imperial Valley, and which marks the western limits of the Colorado Desert, it seems to have gained a firm stronghold.

It occurs only scantily about Palm Springs, but at Indio, some twenty miles to the south and in a much warmer district, it is rapidly becoming a common butterfly. Here it is certainly triple-brooded, and may even have four or five broods. The first hot weather in late March or early April brings it on the wing, but not in any considerable numbers. Towards the first week in June it appears again and by the middle of the month is fairly abundant. But the largest numbers are to be found about the middle of October, continuing well into November. Very probably there is a brood emerging some time in August, but as this is a scorching month on the desert no records of its appearance then have been noted.

On October 21, 1920, I found *eufala* abundant at Indian Wells, a small settlement near Indio, and confined some females in a mason jar with some ordinary lawn grass. These proceeded to lay almost at once when exposed to the hot sun, and by October 23 a total of twenty-eight eggs had been laid. On October 30 these began to disclose, making the egg period nine days.

Brought to Los Angeles, most of the larvae ceased feeding and in a few days were dead, apparently unable to adapt themselves to a seacoast climate so much in contrast with the dryness of the desert. In fact, I have had this same difficulty with all the eggs and larvae I have brought in from the desert. Larvae of *Pholisora libya* Scudder, though supplied with absolutely fresh sprigs of their food-plant, could not be induced to touch them. Likewise, larvae of *Melitaea chara* Edwards refused their *Beleperone* and soon passed away. And this season not a single one of over fifty eggs of *Atlides halesus* Hübner has hatched, although I can see that the embryos have apparently fully developed. But half grown larvae do not seem to mind the change in the least, and readily go on with their transformations.

So but two of my *eufala* larvae survived their visit to Los Angeles, and the record of their transitions is as follows:

Eggs laid	October 23rd, 1920
Eggs hatched	October 30th, 1920
Larvae passed first moult	November 15th, 1920
Larvae passed second moult	December 28th, 1920
Larvae passed third moult	February 2nd, 1921
Larvae passed fourth moult	March 11th, 1921
Pupated	April 1st, 1921
Imagos emerged	April 24th, 1921

This makes a total of 184 days from egg to imago, but very probably on the desert, under natural conditions, the larvae mature much more quickly and pass the winter in a pupal state.

There is nothing of unusual interest to record in the behavior of the young larvae. They form the usual type of vertical nest by drawing together the edges of a blade of grass with ten or a dozen loose strands of silk. In later stages the nest is more perfectly closed, a cylinder being formed in which the larva remains hidden from view and apparently feeding entirely by night. They were extremely sluggish, remaining at times motionless for days at a stretch.

Egg.—Hemispherical, the base sharply flattened. 1.04 mm. in diameter. From base sloping at first very gradually, then from upper two-thirds rather rapidly, to the narrow, rounded summit, where the diameter is but .30 mm. The micropyle is in a shallow weak pit and difficult to detect. The surface of egg rather evenly broken by a delicate tracery

of scarcely perceptible raised polygonal cells, which average .04 mm. in diameter. Color a very delicate pale green, glistening. Height .72 mm.

The young larvae, upon emerging from the eggs, at once attacked the empty shells and in nearly every instance devoured them to the bases.

Larva.—First Instar.—Head subtriangular, rounded, higher and broader than any part of the body, and with the median suture only faintly impressed. Head .56 mm. in diameter, black, shining, delicately rugose and clothed with only a few short straight sharp but weak colorless hairs, at scattered intervals, but most numerous about the frontal triangle. These hairs .08 mm. in length.

Body slender, quite uniform, tapering only slightly posteriorly. In color the body is a pale lemon yellow, with a very delicate whitish sheen.

Series of minute, bristle-bearing papillae arranged on the body as follows: A subdorsal series, located on the anterior portion of the segment, one on each side to a row and rather sharply inclined outwards. A laterodorsal row, centrally located. A suprastigmatal row, placed slightly anterior to middle of segment. An infrastigmatal row, situated just posterior to middle of segment. On the thoracic segments the subdorsals become supralaterals and are there centrally located. These papillae are black, .01 mm. in height, and of the same diameter at base. The arising hairs are black, .04 mm. in height, very slightly enlarged and flattened apically, where the diameter is .01 mm.; the tips pellucid.

Each segment with six, fine, transverse creases, of which the foremost one is the most conspicuous. The transverse dorsal shield of first thoracic segment shining black, narrow, extending laterally to just above the spiracles, .03 mm. in width, but thickened subdorsally. A few fine black hairs on the shield. Anal segment with four, subdorsal, pale yellowish papillae from which project long, colorless, spiculiferous hairs posteriorly, these being .40 mm. in length; also a few shorter, colorless, wavy hairs bordering the anal segment, some as long as .20 mm., others but .08 mm.

Pseudostigmatic blisters laterally on second and third thoracic segments geminate, pale testaceous. Spiracles round, .02 mm. in diameter, with a prominent brownish orange ring. On the eighth abdominal segment the spiracles are enlarged, .04 mm. in diameter, elevated, and higher above the line than the others. A fine, even, dark green dorsal line, .02 mm. in length.

Prolegs and ventral surface pale greenish yellow. Legs very pale yellow brown, shining.

Length 2.56 mm. Height at first thoracic segment .44 mm. Width at anal segment .38 mm.

As the larva feeds the ground color of the body becomes more and more a pale grass green, and white substigmatal and suprastigmatal bands appear, but are not well defined nor prominent in this stage.

Second Instar.—Head .90 mm. in diameter, pale orange brown, mottled with sordid white; the brown quite regularly defined, especially in a median stripe that divides and sends two branching streaks over the front face, and a conspicuous oblique band. Hairs of head weak, sharp, colorless, scattered, .08 mm. in length on the average.

Body profusely sprinkled with minute black papillae, each giving rise to a short, sharp, black hair, .05 mm. in length. The dorsal line even, fine, dark green. Collar as before, piceous black. Anal segment with a rather thick fringe of sharp, wavy, colorless hairs, spiculiferous, some as long as .30 mm. Spiracles round, .03 mm. in diameter, with a fine orange brown annulation.

Body in color pale grass green, with a white sheen especially noticeable on either side of the dorsal line. Prolegs and ventral surface pale green. Legs pale yellow brown. The suprastigmatal and substigmatal white bands still indistinct.

Length 7 mm. Width at first thoracic segment .80 mm. Width at anal segment .72 mm.

Third Instar.—Head 1.16 mm. in diameter, sordid white, with pale orange brown blotchings as in previous stage; along the median suture this blotching is deep brown, almost black. Hairs of head as before, now averaging .12 mm. in length.

Body adorned as before with minute papillae, now .02 mm. in height and with the arising hairs .08 mm. in length on the average. Collar, as before, piceous black. Hairs fringing anal segment as long as .40 mm. Spiracles .04 mm. in diameter, with a distinct orange brown ring; on eighth abdominal segment the spiracles are .08 mm. in diameter. Dorsal line prominent, dark green, .20 mm. in width.

Body in color pale grass green; on either side of the dorsal line the ground color is more or less broken up by whitish blotchings. Prolegs and ventral surface pale grass green; legs pale orange brown, shining, fuscous at tips. The white suprastigmatal band now rather prominent; the white substigmatal stripe much less so.

Length 12 mm. Width at first thoracic 1.06 mm. Width at anal segment 1 mm.

Fourth Instar.—Head 1.60 mm. in diameter, sordid white, marked as before with orange brown stripes, blackish brown along the median suture. Hairs of head as before, some as long as .24 mm., others but .08 mm.

Numerous, black body papillae as before, now .03 mm. in height and of the same diameter at base, with the arising hairs .10 mm. in length, straight, sharp, colorless. Hairs fringing anal segment as long as .56 mm. Spiracles .05 mm. in diameter, round, with a prominent orange brown ring. Dorsal line dark green, prominent, .30 mm. in width.

Body in color a vivid grass green. Prolegs and ventral surface pale grass green. Legs pale orange brown, shining, darker at tips. The suprastigmatal band now yellow white, not very prominent; below it a second, finer, concolorous band, not very distinct. The substigmatal

band white, even, but not at all prominent. The space between the upper band and the dorsal line subject to yellowish white blotchings, especially immediately next to the dorsal line.

Length 17 mm. Width at first thoracic 1.38 mm. Width at anal segment 1.20 mm.

Fifth Instar.—Head 2.08 mm. in diameter, sordid white, and as before marked with orange brown stripes. Sides of head pale gray yellow. Interior to these sides a dark orange brown area broken with a wavy stripe of yellow and with irregularly placed yellow blotchings. The line of the median suture black, spreading out to include the frontal triangle, now a pale gray green. Hairs of head as before, some as long now as .36 mm.

The black body papillae as before, .04 mm. in height and of the same diameter at base, with the arising hairs straight, sharp, colorless or faintly brown tinged, of varying lengths, some .12 mm. long, others but .05 mm. Hairs fringing anal segment as long as .62 mm. Spiracles pallid, .12 mm. in diameter, with fine brown rings. Dorsal line even, dark green, and bordered with an obscure blotching of rather bright yellow. The segmental creases of each segment fine, bright yellow.

Body in color vivid grass green. Prolegs and ventral surface pale grass green. Ventral surface with some short, sharp, colorless, spiculiferous hairs, perhaps .16 mm. in length on the average. Legs pale orange brown, shining, darker at tips. The two suprastigmatal bands as in previous stage, pale yellow, not very prominent nor sharply defined. The substigmatal band white, even, but not conspicuous.

Length 21 mm. Width at first thoracic 1.90 mm. Width at anal segment 1.68 mm.

Chrysalis.—Slender and cylindrical, of almost uniform width until tapering rapidly at the last three abdominal segments. Head with sides straight, slightly narrower than the thorax. Ocellar swellings rather prominent. Head in middle protuberant, the projection extending to a distance of 2 mm. and ending in a rounded knob.

On the abdominal segments a prominent dark green dorsal line, .5 mm. in width, marked on either side with a crenate yellowish white edging. This dorsal line narrowing posteriorly and fading out on the last two abdominal segments. A subdorsal, yellow white band, fairly prominent, beginning on abdominal segment one, parallel with the dorsal line, but converging laterally, and then sweeping back dorsally so as to join the dorsal line at next to the last abdominal segment, where both bands disappear. Tongue case freely extending beyond tips of wings to a distance of 3.4 mm., truncated at end, where the width is .16 mm. In color the free portion of the tongue is a sordid green, with a prominent golden brown edging.

Color a delicate green, slightly deeper in tone on the abdomen dorsally. Head protuberance and cremaster opaque. A few fuscous hairs, clavate and sharply bent, on edges of head case; these are exceedingly minute, but .02 mm. in height, and very infrequent. Spiracles elongate, .14 mm. in length, with a distinct brown edging. Hooklets of cremaster opaque, .26 mm. in length, abruptly crooked apically into a clubbed head, .02 mm. in width and reddish brown tinged.

Length 20.5 mm. Width of head 3 mm. Width of thorax 3.75 mm. Suspended weakly by a small button of silk anally, and with a strong but loose thoracic girdle.

Notes and News.

ENTOMOLOGICAL GLEANINGS FROM ALL QUARTERS OF THE GLOBE

Old Time Economic Entomology on Staten Island, New York.

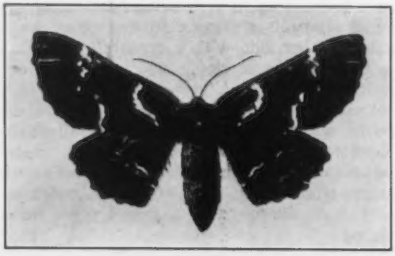
In an old book of records of the town of Northfield, Staten Island, labeled "Town Records, 1783 to 1823," an agriculturist of the period recorded at least two ways of combatting insect pests. It was thoughtful of him to put his information in such a safe place, for of course the book of town records was to be preserved, and our regret is that he failed to fill up all of the blank pages with observations on the natural history of Staten Island when he was trying out his experiments with soft cow dung, water and "Eder sprouts."

The recipes are as follows: "1. Tanse boiled and Cabich or other Plants Weterd with the Decoction prevents flys &c, Eating them.

"2. Soft Cow Dung put in Water and Eder [Elder?] Sprouts bruised and Steepd in the Water put over any plant prevents any insects injuring them."—WM. T. DAVIS, New Brighton, S. I., N. Y.

The Moth Nacophora quernaria variety atrescens (Lep.: Geometridae).

The black and white variety of *Nacophora quernaria* described by Hulst in the Canadian Entomologist for June, 1898, under the name of *atrescens*, appears to be very rare in collections. It is not represented in the extensive collections of the American Museum of Natural History, the Museum of the Brooklyn Institute of Arts and Scienecs or in the Academy of Natural Sciences of Philadelphia. The type came from "London, Ontario, Canada; from Mr. Moffat."



Nacophora quernaria var. *atrescens* Hulst.

In the summer of 1921 the senior author found a large Geometrid caterpillar on wild cherry at Upper Montclair, New Jersey, and on April 23, 1922, the female moth, reproduced in the accompanying figure, appeared. It is one of the most beautiful of Geometrid moths, and, as far as known, the first record of the insect from this part of North America.—ERNEST SHOEMAKER and WM. T. DAVIS.

ENTOMOLOGICAL NEWS

PHILADELPHIA, PA., DECEMBER, 1922.

"He Helped Me When No Others Volunteered."

The cover of the NEWS for this year, 1922, has borne a small portrait of Charles Alfred Blake, an early member of the American Entomological Society and a contributor to the literature on American Lepidoptera and Hymenoptera. After his death on June 24, 1903, an obituary notice of him appeared in this journal for September, 1903, accompanied by a larger and later photograph. That notice contains this interesting recollection by Mr. E. T. Cresson:

> I remember the many nights Mr. Blake toiled with me in the publication of the Proceedings and Transactions, and he was ever ready and willing to help me when no others volunteered; we worked together side by side at the case, and while I rolled on the ink, he pulled the press—being the stronger. He was a cheerful companion, and his good humor rendered the work easier and the time passed more pleasantly. The Society is greatly indebted to him for his endeavors in its behalf.

Those endeavors are referred to by the late Dr. Henry C. McCook in the Introduction to the History of the same Society, published in 1909. Speaking of the founders, he wrote:

> these pioneers, discerning clearly the importance of the work to which they had set themselves, and the need of an organ of communication with entomologists elsewhere, began almost immediately the publication of a journal of their proceedings. The lack of income and of state aid and patronage did not deter them. Indeed it did not even occur to them to appeal to city, state or nation for help. They purchased fonts of type and a hand press and set up and printed off, by their own labor out of business hours, as well as wrote and edited their discoveries, descriptions and reflections thereon.

It is well to recall these voluntary, unpaid labors of our predecessors, for the need of similar, unselfish aid is as great today as it was in the eighteen hundred and sixties—nay, greater. "When no others volunteered." Then, as now, it was the few who did. The many looked on.

The University of Michigan-Williamson Expedition to Brazil.

Mr. Jesse H. Williamson went by the steamship Bahia from Pará on August 18, 1922, to Rio de Janeiro, arriving August 28, and having landed en route for a few hours respectively at Maranhão, Ceara, Recife (Pernambuco) and Bahia. He collected in the vicinity of Rio from August 31 to September 27 on favorable days, as there was much cloudy weather when insects were not visible. He arrived at his home in Bluffton, Indiana, in the latter half of October.

Entomological Literature

COMPILED BY E. T. CRESSON, JR., AND J. A. G. REHN.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species, will be recorded.

The numbers in **Heavy-Faced Type** refer to the journals, as numbered in the following list, in which the papers are published.

All continued papers, with few exceptions, are recorded only at their first installments.

The records of papers containing new genera or species occurring north of Mexico are grouped at the end of their respective Orders.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

The titles occurring in the Entomological News are not listed.

4—Canadian Entomologist, Guelph, Canada. **5**—Psyche, Cambridge, Mass. **6**—Journal of the New York Entomological Society. **7**—Annals of the Entomological Society of America, Columbus, Ohio. **8**—The Entomologist's Monthly Magazine, London. **9**—The Entomologist, London. **13**—Journal of Entomology and Zoology, Claremont, Cal. **30**—Tijdschrift voor Entomologie, The Hague, Holland. **33**—Annales de la Societe Entomologique de Belgique, Brussels. **37**—Proceedings of the Hawaiian Entomological Society. **49**—Entomologische Mitteilungen, Berlin-Dahlem. **54**—Proceedings of the Biological Society of Washington, D. C. **62**—Bulletin of the American Museum of Natural History, New York. **68**—Science, Garrison-on-the-Hudson, N. Y. **69**—Comptes Rendus, des Seances de l'Academie des Sciences, Paris. **74**—Proceedings of the Staten Island Institute of Arts and Sciences, New York. **76**—Nature, London. **85**—The Journal of Experimental Zoology, Philadelphia. **90**—The American Naturalist, Lancaster, Pa. **91**—The Scientific Monthly, Lancaster, Pa. **101**—Journal of The Linnean Society of London. **103**—Biologisches Centralblatt, Leipzig. **111**—Archiv fur Naturgeschichte, Berlin. **114**—Entomologische Rundschau, Stuttgart. **116**—Entomologische Zeitschrift, Frankfurt a. M. **138**—American Museum Novitates. **143**—Stettiner Entomologische Zeitung.

GENERAL. Gibbs, L.—Obituary notice. **4**, liv, 167-8. **Horn, W.**—Et meminisse et vaticinari liceat. Ueber erfahrungen mit papierschere und kleistertopf. **49**, xi, 130-1. **Jordan, D. S.**—The

production of species. **68,** lvi, 448. **Sharp, D.**—Obituary notice. **9,** 1922, 217-21; **8,** 1922, 234-7; **76,** cx, 521-2. **Wade, J. S.**—The scarab: emblem of eternity. **4,** liv, 145-9. **Weiss, H. B.**—The fungous insect fauna of a mesophytic woods in N. Jersey. **54,** xxxv, 125-28. **Williams, C. B.**—Co-ordinated rhythm in insects; with a record of sound production in an aphid. **9,** 1922, 173-6.

ANATOMY, PHYSIOLOGY, ETC. Baldi, E.—Studi sulla fisiologia del sistema nervoso negli insetti. **85,** xxxvi, 211-88. **Clausen & Collins**—The inheritance of ski wings in Drosophila melanogaster. (Genetics, vii, 385-426.) **Garstang, W.**—The theory of recapitulation: a critical re-statement of the biogenetic law. **101,** xxxv, 81-102. **Hyde, R. R.**—An eyeless mutant in Drosophila hydei. (Genetics, vii, 319-34.) **Janet, C.**—Considerations sur l'etre vivant. L'individu, la sexualite, la parthenogenese et la mort, au point de vue orthobiontique. Beauvais, 1921. 196 pp. **Krausse, A.**—Myrmekologie und phylogenie. **111,** 1922, A, 9, 79-89. **Lancefield, D. E.**—Linkage relations of the sex-linked characters in Drosophila obscura. (Genetics, vii, 335-84.) **Pearl & Parker**—On the influence of certain environmental factors on duration of life in Drosophila. **90,** lvi, 385-405. **Timberlake, P. H.**—Observations on the phenomena of heredity in the ladybeetle, Coelophora inaequalis. **37,** v, 121-33. **Wolff, C.**—Uber konzentrische strukturen im eikern von coleopteren. (Arch. f. Zellforschung, Berlin, xvi, 443-62.)

ARACHNIDA AND MYRIOPODA. Ewing, H. E.—The phylogeny of the gall mites and a new classification of the suborder Prostigmata of the order Acarina. **7,** xv, 213-22. **Oudemans, A. C.**—Ueber die metamorphose der vogelbewohnenden Acaridiae. **30,** lxv, 184-91. **Pawlowsky, E. N.**—Zur mikroskopischen anatomie des blutgefassystems der skorpionen. (Act. Zool., Stockholm, 1922, 461-74.) **Thor, S.**—Ueber die phylogenie und systematik der Acarina mit beitragen zur ersten entwicklungsgeschichte einzelner gruppen. (Nyt Mag. f. Naturv., Kristiania, lx, 113-30.)

Chamberlin, R. V.—The No. American spiders of the family Gnaphosidae, **54,** xxxv, 145-72. **Chapin, E. A.**—On Simonella, a genus of Salticid spiders new to No. Am. **54,** xxxv, 129-32. **Marshall, R.**—New American water mites of the genus Neumania. (Tr. Wisc. Ac. S., A. & L., xx, 205-14.)

THE SMALLER ORDERS—Branch, H. E.—A contribution to the knowledge of the internal anatomy of Trichoptera. **7,** xv, 256-75. **Lacroix, J. L.**—Etudes sur les Chrysopides. (An. Soc. Linn. Lyon, 1921, 51-107.) **Longinos Navas, R. P.**—Insectos nuevos o poco conocidos. (Mem. R. Ac. Cien. y Artes, Barcelona, xvii, No. 15.) **Lucas, W. J.**—Colour preservation in dragonflies. **9,** 1922, 209. **Sulc, K.**—Prispevky ku poznani Psyll. III. (Roz. Ceske Ak. Fr. Jos., Praze,

xxiv, II, 5.) **Withycombe, C. L.**—The wing venation of the Coniopterygidae. **9,** 1922, 224-5.

Macnamara, C.—Two new species of Achorutes (Collembola). **4,** liv, 149-53.

ORTHOPTERA. Willemse, C.—Beschreibung einer neuen Rhipipteryx aus Sud-Amerika. **49,** xi. 174-76.

HEMIPTERA. Barber, H. G.—Note on Luteva carolina. **6,** xxx, 130. **Donisthorpe, H.**—How the honey-dew of plant-lice is excreted. **8,** 1922, 233-4. **Heikertinger, F.**—Sind die wanzen (Hemiptera heteroptera) durch ekelgeruch geschutzt? **103,** xlii, 441-64. **Kershaw & Muir**—The genitalia of the Auchenorhynchous Homoptera. **7,** xv, 201-12. **Morrison, H.**—On some trophobiotic Coccidae from British Guiana. **5,** xxix, 132-52. **Parshley, H. M.**—Tingitidae or Tingidae. **68,** lvi, 449.

Bergroth, E.—The American species of Ploecariola. **143,** ii, 77-81. **Essig, E. O.**—A new aphis on California sage (Aphis hiltoni). **13,** xiv, 61-2. **Ferris, G. F.**—Notes on Coccidae. **4,** liv, 156-61. Contributions toward a monograph of the sucking lice. (Stanf. Univ. Pub. Biol. Sc., ii, 139-78.)

LEPIDOPTERA. Andrews, J. E.—Some experiments with the larva of the bee-moth Galleria mellonella. (Tr. Wisc. Ac. S., A. & L., xx, 255-62.) **Chase, R. W.**—The length of life of the larva of the wax-moth Galleria mellonella, in its different stadia. (Tr. Wisc. Ac., S., A. & L., xx, 263-68.) **Fassl, A. H.**—Neue schmetterlingsformen aus Brasilien. **116,** xxxvi, 38-9; 42-43. **Giacomelli, E.**—Trois lepidopteres nouveaux de La Rioja, Rep. Argentine. **9,** 1922, 225-7. **Jordan, K.**—Einige neue Saturnoidea aus Sudamerika. **49,** xi, 193-5. **Kruger, E.**—Catoblepia orgetorix und verwandte arten in Columbien. **114,** xxxix, 38-9. **Leiby, R. W.**—Biology of the goldenrod gall-maker Gnorimaschema gallaesolidaginis. **6,** xxx, 81-94. **Marshall, W. S.**—The development of the frenulum of the wax moth, Galleria mellonella. (Tr. Wisc. Ac. S., A. & L., xx, 199-204.) **Meyrick, E.**—Exotic microlepidoptera. Vol. 2, Parts 16-17. **Tee-Van, J.**—The dance of the butterflies. (Zool. Soc. Bull., N. Y., xxv, 120-22.)

[**McDunnough, J.**]—A correction. **4,** liv, 168. **Watson, F. E.**—Miscellaneous notes and records of local L., and description of two new aberrations. **6,** xxx, 131-5.

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oiseaux a l'egard des Culicines. **69,** clxxv, 646-8. **Lloyd, H.**—Larvae of Phormia chrysorrhea, found upon nestling bluebirds. (Can. Field Nat., xxxvi, 116.) **Parker, G. H.**—Possible pedogenesis in the blow-fly, Calliphora erythrocephala. **5,** xxix, 127-31. **Tonnoir, A.**—Notes sur le genre Nemopalpus et description d'une espece nouvelle. **33,** lxii, 125-36. **Vimmer, A.**—Nekolik poznamek k morfologii larev Dipter. (Roz. Ceske Ak. Fr. Jos., Praze, xxiii, II, 44.) **Zavrel, J.**—Ustni ustroje larev Pelopiin (Tanypinae). (Roz. Ceske Ak. Fr. Jos., Praze, xxv, II, 24.)

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Blatchley, W. S.—Notes on the Rhynchophora of eastern N. A., with characterizations of n. gen. and descriptions of n. sps. **6,** xxx, 95-106. **Hopping, R.**—New sps. of the old genus Leptura and allied genera. **4,** liv, 162-6. **Notman, H.**—A new genus and sp. of weevil from Texas. **6,** xxx, 128-9.

HYMENOPTERA. Bouvier, E. L.—Nouvelles recherches sur l'apparition des individus reproducteurs dans la fourmi fauve et la fourmi des pres. **69,** clxxv, 555-58. **Brues, C. T.**—Conoaxima, a new gen. of the hymenopterous family Eurytomidae, with a description of its larva and pupa. **5,** xxix, 153-8. **Friese, H.**—Nachtrag zur bienenfauna von Costa Rica. **143,** lxxxii, 74-98. **Herbst, P.**—Revision der Halictus arten von Chile. **49,** xi, 180-91. Zur synonymie chilenischer blumenwespen. Uber chilenische hymenopteren, welche Brethes erwahnte. Zur synonymie chilenischer grabwespen. **143,**

lxxxii, 99-116. **Kieffer, J. J.**—Causeries sur l'abeille. (Mem. Ac. Nat. Metz, 1921, 113-233.) **Peacock, A. D.**—Observations on the biology of sawflies. **9,** 1922, 227-31. **Plath, O. E.**—A unique method of defense of Bremus fervidus. **5,** xxix, 180-7. **Robertson, C.**—Synopsis of Panurgidae. **5,** xxix, 159-73. **Stumper, R.**—L'influence de la temperature sur l'activite des fourmis. **33,** lxii, 137-40. Quantitative Ameisenbiologie. **103,** xlii, 435-40. **Wheeler, W. M.**—Ants of the genus Formica in the tropics. **5,** xxix, 174-77. Keys to the genera and subgenera of ants. **62,** xlv, 631-710. Ants, their development, castes, nesting and feeding habits. **91,** xv, 385-404. Neotropical ants of the genera Carebara, Tranopelta and Tranopeltoides. **138,** No. 48.

Rohwer, S. A.—A new parasite of the spruce budworm. **4,** liv, 155-6.

ECTOPARASITES. Edited by Dr. K. JORDAN and the Hon. N. CHARLES ROTHSCHILD, M. A., Vol. I, pt. 4, pp. 199-286, text figures 195-280. Issued September 1, 1922. [Zoological Museum, Tring, Herts, England.]—This publication is issued at irregular intervals, the preceding three parts bearing the dates December 30, 1915; January 20, 1920, and January 15, 1921, and being devoted entirely to fleas. The present number contains articles on Polyctenidae (including one on *The American Polyctenidae* by Dr. Jordan), on Clinocoridae and Siphonaptera (with some new species of fleas from North, Central and South America). Of the Polyctenidae Dr. Jordan says: "The five American species which are known [3 of them new] are so much alike that not only must they be placed in one single genus *Hesperoctenes* Kirk. (1906), but cannot be distinguished from one another except by a close examination of the details in the vestiture and of the relative proportions of the sections of the body and appendages. *Hesperoctenes* is a primitive genus which has remained comparatively stationary, the species not having developed in very different directions . . . Considering the large number of species of bats which are known we may conclude that the ten Polyctenidae so far discovered represent but a small proportion of the species actually existing on these mammals in the tropical and subtropical countries."

There is a *Note on the Distribution of the Organ of Berlese in Clinocoridae,* also by Dr. Jordan. He finds that this organ (which appears externally as a deep triangular incision in the apical margin of the fourth abdominal sternite of females, placed asymmetrically on the right side, about midway between the centre and the lateral margin of the segment), is present in seven described species of *Clinocoris* (*Cimex* auct.), *Bertilia valdiviae* and two species of *Oeciacus,* the Swallow Bugs. In *Haematosiphon* and *Cacodmus* there is an analogous organ on the *upper* side of the fifth abdominal segment, central in *Haematosiphon* ("which is presumably the more primitive position"), asymmetrical toward the

left side in *Cacodmus*. Berlese's organ has been supposed to be an organ of copulation, receiving the spermatozoa direct from the male and passing them on to the body cavity, whence they reach the oviduct and the ova. In the Clinocorid genus *Loxaspis* and the nearly related Polyctenidae no such organ is known.

Doings of Societies.

Entomological Section, The Academy of Natural Sciences of Philadelphia.

Meeting of January 26, 1922. Five persons present, Dr. Skinner presided.

COLEOPTERA.—A specimen of the sweet potato weevil, *Scylas formicarius*, from Hayti was presented by Mr. Kisliuk.

ORTHOPTERA.—Mr. Rehn made a few remarks on two Cuban species of the genus *Eurycotis*, and followed this by commenting upon the number and distribution of the West Indian species of the genus *Epilampra*, with particular reference to those of Hispaniola.

Meeting of March 23, 1922. Eleven persons present, Vice-director R. C. Williams presided. Messrs. John C. Hollinger, R. H. Hutchison and Arthur D. Whedon were elected members.

Mr. Rehn gave an interesting account of the collecting trip he made last summer with Mr. Hebard in the western United States.

DIPTERA.—Mr. Cresson exhibited a collection of named Diptera from the East Indies, which he said would make a valuable addition to the collection. It contained more than 100 species new to our series. Mr. Rehn moved that the Conservator approve the purchase by the Academy or the Section for the sum of $25.00. Carried.

Mr. Hornig mentioned the late appearance of mosquitoes this season. He noted for the first time the appearance of *Culex canadensis* the day before.

Meeting of May 26, 1922. Nine persons present, including Dr. J. M. Aldrich, U. S. National Museum, visitor. Director Philip Laurent in the chair.

DIPTERA.—Mr. Cresson reported the purchase by the Academy of the collection of Diptera to which attention of the Section was called at the last meeting.

Dr. Aldrich gave an interesting account of his trip to Alaska the preceding summer. He spoke of the present accessibility of the country, of the climatic conditions in the interior as so different from those of the coastal regions, which necessarily have much influence on the insect fauna. He spoke of the similarity of the flora and insect fauna with those of northern Minnesota and southern Canada. Regarding the Diptera, he said there was an abundance of species of the Drosophilidae

and Anthomyiidae in the interior, but there was an apparent scarcity of the Muscoidea in general. He did not see any specimens of the housefly until he returned to British Columbia. For the first time in all his years' collecting he captured both sexes of a species of the Lonchopteridae in numbers at the same time. He said both sexes of these flies are rarely captured at the same time.

LEPIDOPTERA.—Mr. Williams exhibited some of the larger North American Hesperidae and drawings of their male genitalia, calling attention to several species superficially very close, but which showed remarkable differences in the characters of these organs.

ORTHOPTERA.—Mr. Rehn made a communication upon the West Indian species of the blattid genus *Plecoptera*, illustrating his remarks with a series including all the species now known from those islands. The speaker discussed the taxonomic features of the species and their groups, particularly those of the genitalia.

EZRA T. CRESSON, JR., *Recorder.*

OBITUARY.

Two obituary notices of the late Dr. DAVID SHARP lie before us—from *The Entomologist* for October, by W. J. Lucas, and from *The Entomologist's Monthly Magazine*, for the same month, by J. J. Walker. Each is accompanied by a (different) portrait. One refers to him as of the "very front rank of zoologists," the other as "one of the most distinguished Entomologists of our time." "Unquestionably," says one, "Dr. Sharp's *magnum opus* is the treatise on 'Insects' forming the greater part of two volumes [V, VI] of the 'Cambridge Natural History'," published in 1895 and 1899, "but it is safe to say that no work of equal value on general Entomology has been produced in this country since Westwood's 'Introduction to the Modern Classification of Insects' appeared more than half a century previously." When the present writer had to select a general work on insects as part of a necessarily small collection of books to accompany him during a year in Costa Rica, his choice fell upon this work of Sharp's. Although Dr. Sharp was a specialist in Coleoptera, his wide sympathies and experience made it possible for him to deal more equally with the various orders of insects than almost any other one man could have done, and the two volumes—if largely compilations from the nature of the task—contain much new material throughout.

Dr. Sharp's greatest service to zoologists, and hence to entomologists, was his recordership of the section on insects in the *Zoological Record* from 1885 and his editorship of the entire annual volumes from 1891. "This work he continued till the year of his death, even completing the reading of the final proofs of records for 1920 during his last illness."

Mr. Walker says: The magnitude of Dr. Sharp's entomological work during his long life may be estimated by the fact that no fewer than 257 entries stand under his name in the Royal Society's Catalogue of Scientific Papers and the Zoological Record to date, besides a multitude of minor articles in our own and other magazines.

His chief works on the Coleoptera are *A Revision of the British Species of Homalota* (1869), on the Staphylinidae of Japan (1874) and of the Amazon Valley (1876); on Coleoptera of New Zealand (1878, 1885) and of the Hawaiian Islands (1878-80, and in the *Fauna Hawaiiensis,* 1899, 1908); *On Aquatic Carnivorous Coleoptera or Dysticidae* (1880-82); on water-beetles, Staphylinidae, most of the Clavicornia, certain Rhynchophora, Brenthidae and Bruchidae in the *Biologia Centrali-Americana* (1885-1911), *Catalogue of the British Coleoptera* in conjunction with Canon W. W. Fowler (1893), Rhynchophora of Japan (1896), and *The Comparative Anatomy of the Male Genital Tract in Coleoptera* (with F. Muir—his son-in-law—1912).

He was born October 15, 1840, at Towcester, Northants, and died August 27, 1922, at Brockenhurst. From about his twelfth to his twenty-fourth year he lived in London with his father, a leather merchant, where—

Herbert Spencer was for some considerable time an inmate of his father's house and there can be no doubt that the keen and logical quality of Dr. Sharp's mind was in large measure due to his early association with the eminent philosopher, who gave him much encouragement and assistance in his first efforts in the study of Natural History, and of whom he was wont to speak with respect and affection to the end of his life. In 1904 [he] wrote an article in the Zoologist entitled *The Place of Herbert Spencer in Biology,* having particular reference to him in connection with the teachings of Charles Darwin.

Sharp studied medicine for two years in St. Bartholomew's Hospital, London, then at the University of Edinburgh, where

he received the degree of M.B. in 1866. From 1867 to 1883 he practiced in Dumfriesshire; from 1890 to 1909 he was Curator of the University Museum, Cambridge. His own collection of beetles from all parts of the world was acquired for the British Museum, his entomological library by the Cawthron Institute, Nelson, New Zealand; his British beetles remain with his family.

He was President of the Entomological Society of London in 1887 and 1888, elected a Fellow of the Royal Society in 1890, an honorary M.A. of Cambridge, one of the fifteen honorary members of the Entomological Society of France, corresponding member of the American Entomological Society (1898), and of many other scientific associations.—P. P. CALVERT. . .

HAMILTON H. C. J. DRUCE, son of the Lepidopterist, Herbert Druce (1846-1913, see the NEWS, xxiv, page 432), died June 21, 1922, at the age of 54. He specialized on the Lycaenid and Hesperid butterflies, his most important publications being *Monograph of Bornean Lycaenidae* (1895, 1896) and *Neotropical Lycaenidae* (1907), both in the *Proceedings of the Zoological Society of London*, which contain also a number of his shorter papers.

His only separately published work was a small but very valuable volume* containing photographic reproductions of many of the type specimens of Lycaenidae in the Berlin Museum, but he was, until forced to give up on account of ill health, actively engaged in completing the volumes on Rhopalocera in the Fauna of British India Series. His collections are now in the Hill Museum, Witley, having been purchased by Mr. J. J. Joicey some three or four years ago. (Entom., Sept., 1922.)

EDWARD LOUIS GRAEF, the lepidopterist, of Brooklyn and Bay Shore, New York, died February 15, 1922, in his eightieth year. An obituary notice and portrait were published in the *Bulletin of the Brooklyn Entomological Society* for April (received August 17).

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*This is doubtless: *Illustrations of South African Lycaenidae; being photographic representations of the type specimens contained in the Imperial zoological museum at Berlin.* London, 1910, pp. 1-35, 8 pls., quoted in the *Zoological Record* for 1910, Insects, pp. 37, 321.—EDITOR.

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AND

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VOLUME XXXIII, 1922

PHILIP P. CALVERT, PH.D., Editor
E. T. CRESSON, JR., Associate Editor

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EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and only when necessary those at the top (being longest in) are discontinued.

Wanted—Species of Homoptera, Hemiptera and Orthoptera not represented in my collection in exchange for duplicate material of these orders from South Dakota. List of duplicates on application. H. C. Severin, South Dakota State College, Brookings, South Dakota.

Buprestidae, Cleridae, and **Carabinae** wanted from U. S. or Buprestidae of the world. Will collect insects of any group (except Lepidoptera) in exchange or pay cash. Alan S. Nicolay, 416a Grand Ave., Brooklyn, New York.

For Exchange—A large number of live cocoons of Callosamia promethea, C. cynthia and P. cecropia for other pupae or Lepidoptera. D. C. Heim, Sunbury, Pa.

Wanted to Exchange—N. A. Coleoptera for same not in my collection. Carl Selinger, 4419 Dover St., Chicago, Ill.

Wanted for Cash or Exchange—Catocala eggs, also brilliant colored butterflies and moths for trays. Mrs. Robert Milde, Lewiston, Minn.

Syrphidae from all parts of North America wanted. Monographing the family.—C. H. Curran, Department of Entomology, University of Kansas, Lawrence, Kansas.

Will collect in all orders except Lepidoptera, in exchange for Cerambycidae (longicorn beetles) and Pentatomidae (stink-bugs). G. Chagnon, P. O. Box 521, Montreal, Canada.

I will collect Coleoptera and Lepidoptera in southwest Arkansas for those so interested.—Miss Louise Knobel, 417 West 2nd Avenue, Hope, Arkansas.

Correspondence solicited from anyone desiring general collections of insects, to be made in Costa Rica. Austin Smith, Apartado 412, San José, Costa Rica.

Wanted—For cash, during winter of 1922 and 1923. pupae of Saturniid moths. Please state species, quantity and price. P. Rau, 2819 S. Kingshighway, St. Louis.

Wanted—Am working on a Revision of the Buprestidae of the West Indies and would like to examine any material in this family from that region. W. S. Fisher, U. S. National Museum, Washington, D. C.

For Exchange—A large number of Papilio Turnus, P. Cresphontes and P. Ajax pupae, or the same specimens in papers, for other pupae or Lepidoptera. Carl Selinger, 4419 Dover St., Chicago, Ill.

Wanted—Dytiscidae not in my collection, in exchange for local specimens. Offer Coelambus sellatus, Oregonus, etc. F. S. Carr, 11050 123rd St., Edmonton, Alberta.

Coleoptera for exchange—Cicin. generosa, hirticollis, modesta, sexguttata, 12-punctata, Saperda populnea, Uro. fasciata, Donacia subtilis, palmata, texana-minor, biimpressa, refuscens. Ernest Baylis, 5011 Saul St., Philadelphia, Pa.

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